

Any Light Particle Search II

first results and prospects

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Abstract: ALPS II at DESY in Hamburg searches for axions — hypothetical particles that could help explain dark matter and other mysteries of modern physics. The experiment uses the “light-shining-through-a-wall” technique: laser light is sent toward a light-tight barrier, while strong magnetic fields may allow a tiny fraction of photons to convert into axions, pass through the wall, and reappear as light on the other side.

In its first science run, ALPS II excluded photon–axion conversion probabilities down to the $1e-13$ level, improving the sensitivity to the axion–photon coupling strength by about a factor of 20 over previous experiments of this kind. The ongoing upgrade is expected to make ALPS II the first purely laboratory-based experiment to probe beyond existing astrophysical limits on axions.

After the search for new particles, the ALPS II infrastructure will also be used to study the quantum vacuum through magnetic birefringence and, ultimately, to search for high-frequency gravitational waves

Miércoles 21 de octubre, 10:30 , seminario de Física Nuclear



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